PARACHUTE DESIGN CHALLENGE

[redacted]

PERIOD#9

INTRODUCTION TO TECHNOLOGY/ ART

BROOKLYN TECHNICAL HIGH SCHOOL

MR. GOLDMAN, TEACHER

FEBRUARY 15, 2001

Excellent report. (A)
Glad you enjoyed the project.

Name [redacted] Period 7

Parachute Report Assessment

1. **Cover** Neat ✓ Correct Format ✓ Correct Information ✓

Next time please keep info at bottom to lower right corner (as in my sample.)

2. **Table of Contents** Included ✓ Pages Numbered ✓ Page Numbers on T of C ✓

3. **The Design Challenge** Included ✓

4. **Orthographic Projection** Included ✓ (4-)

3 views shown ✓ Views correctly oriented ✓- * Major dimensions included ✓
Ruled border ✓ Title Block ✓ Title Block information complete/correct ✓

You've got the idea. Good job.
I'm a bit confused by the top view + the # of strings. See me on there.

* top view must be directly over front view. In your case, since the chute is symetrical, front + side views should be exactly same.

5. **Discussion** Included ✓ Titled ✓ (A)
Process described ✓+ Variables listed ✓+ * Variables' affect examined ✓+

What worked well/what did not ✓+ Changes suggested ✓ Extra Credit ✓

Very good job here. Thoughtful, thorough + well written. Keep it up Yi

* You list variables most clearly in #5

6. **Appendix** Title Page ✓ Test Records included 5 (A+) Other items —

These test records suggest you did thoughtful, serious + careful work.
I'm not sure where 100 meters came from (or for that matter 6' (was that at home.) If you were getting consistent results/times in the first 4-5 times - no need to take 10 tests! Try to be more specific when describing changes made + explaining what you learned (conclusions)

See back for additional comment ... help me understand what ... help you be clear + ...

Table of Contents

ame [redacted] Period 7

Parachute Design Challenge I

tuation:
rachutes are devices most often used to increase the time it takes for an object to fall a given distance rough the air. (They are also be used to slow a vehicle or airplane to assist it in coming to a stop.) When ed in vertical drops, parachutes generally look like large canopies with a cargo tethered or tied to them.

ne force of gravity causes objects, including parachutes, to fall towards the earth's surface. If we increase e mass (weight) of a falling parachute or the load it is carrying (without changing anything else) we crease the force due to gravity, and the parachute and its load will fall faster.

falling parachute is designed to resist the pull of gravity. As it falls through the air, it collides with air olecules under it. Air has mass, and this provides a resistance to the falling motion of the parachute and its rgo. This air resistance is called drag. If we increase the surface area of a parachute (without changing ything else) we increase the number of collisions between the parachute and surrounding air molecules, at is we increase the drag, and it will drop slower. - How many coffee filters are allowed?

roblem:
esign a parachute that takes the longest time to fall a specified distance.

pecifications:
Only the coffee filters provided by the teacher may be used to fabricate the parachute "canopy."

A minimum load of at least three washers (1/4", provided by the teacher) must be attached to the parachute as a load or cargo. Additional weight may be added.

The drop height will be from the bottom of the light fixtures. Only one person may hold the parachute in preparation for dropping. The parachute must be touching the light fixture when it is dropped/released.

ules:
Students will work in groups. Every student must make his/her own parachute for the final "contest."

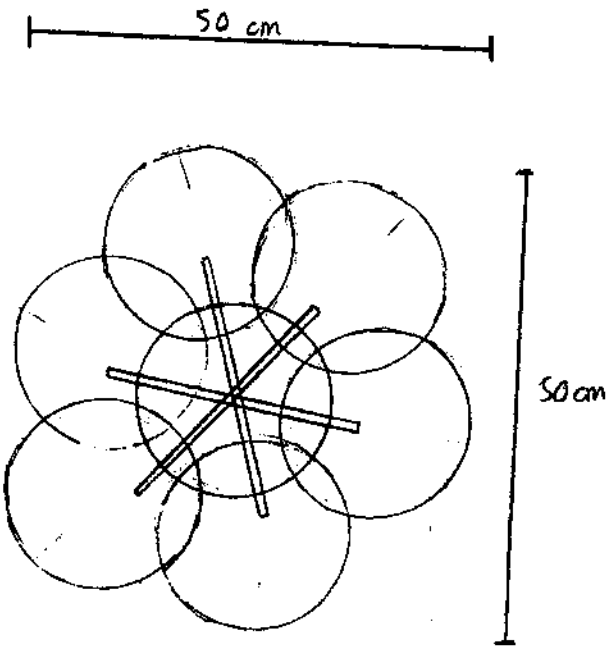
Drop time will be determined with a stopwatch provided by the teacher and will be kept by a students appointed by the teacher as "time keeper."

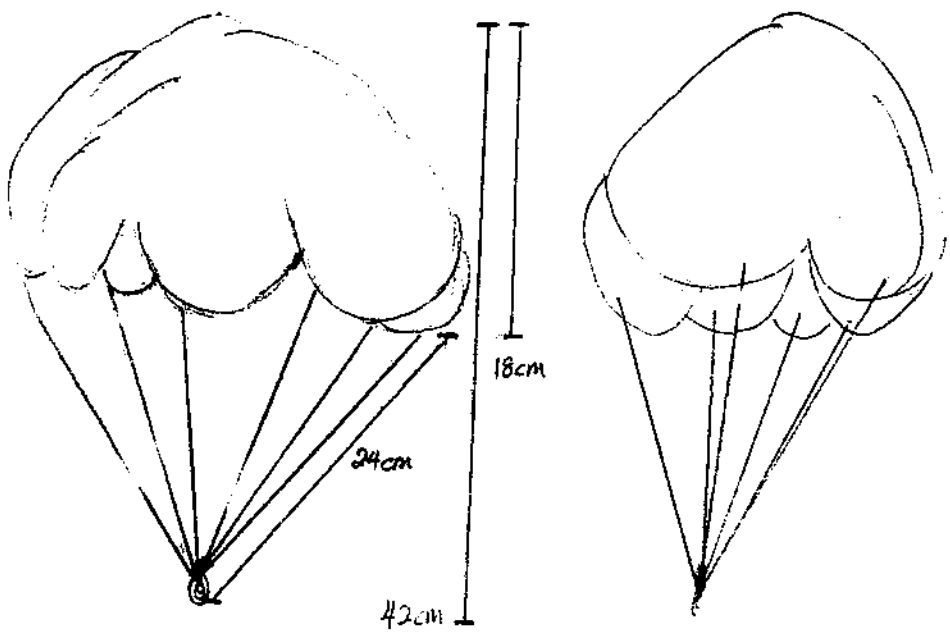
Each student will drop his/her parachute a maximum of 3 times. The number of drops will be determined by the teacher, depending of the time available.. The longest time aloft will be counted.

Group drop times will be determined as follows:
All team members' drop times will be totaled and the sum divided by the number of team members. If a student does not have a qualifying parachute to drop on the day of the "contest" his/her drop time will be zero seconds and will be added to the teams total before dividing the total.

The team with the highest score, calculated as defined in #4, will be declared the winner.

The date of the contest will be Thursday 8th.





Parachute	Period 7 Group 1	02-13-01	Drawn By: [redacted]

Discussion

Process

1. We listed all the variables that could affect the parachute's performance.
2. We assigned two variables to each person in the group to test out for the parachute.
3. We came back with our results we had from our tests on the variables.
4. With results from the variables we tested our own parachute that we had begun to make.
5. We recorded our results that we had received from our own parachute, and we told each other what we learned from our results with the different parachutes we made so far.

Learned:

-The bigger the parachute is, the longer it takes to reach the floor.

-If the string is long on the parachute, then it allows the parachute to retain more air.

-Adding frames to the parachute helps support the shape of the parachute and prevents the parachute from collapsing inwards.

-Reducing the number of holes in a parachute gives the parachute the characteristic of swaying.

-Location of the strings inwards of the parachute does not affect the parachute's performance, instead the unequal lengths of the strings affected the parachute's performance.

-Using more tape to cover up any potential areas in the coffee filter allows the parachute to fly better due to the reduced air that passes through.

6. We incorporated what we learned from all the parachutes that we made so far into the next draft of our parachute.

7. After we each made our next draft of our parachute we each separately critique each other's parachute when we saw the parachute fall, and how to make it slightly better.
8. After all the critiques, we decided which critiques would be useful to the parachute for us to use in making our last parachute, and what critiques to discard.
9. We finished making up our parachutes and check for no holes in our parachute that allows air to pass and even strings that make up the harness.

Critique

Some variables that affected the flight of my design seem to be that when my parachute was close to reaching the floor, the parachute collapsed and fell upside down that is counted as a fast flight. What I would try to change in the parachute would be to add frames to surround the round shape of my parachute. By doing this, I hope that this will stop the parachute from collapsing. Adding frames to the side of my parachute would help because it adds more weight around the side of the parachute, which would make it harder for the air to turn the parachute upside down.

In my design, I think the paper frames worked well to help keep the parachute from collapsing inwards, because this parachute fell more slowly that all my other designs of my parachute. What didn't work well my design were the strings, they were never all at equal lengths that affected the parachute's performance on the day of the contest. And one final thing that I believe limited my parachute's performance was the wrinkles that resulted from too much folding. Because the coffee filters were wrinkled, the coffee filters couldn't spread and fly to help the parachute sway, and stay in the air as I had hoped.

Extra Credit

I enjoyed working on the parachute challenge, and I think that it should be included as a part of this class next year. This challenge was different from all our other challenges because it was the shortest project out of all the other projects. But I enjoyed this challenge because there was less pressure on us in working on this project, than any other project. There wasn't as much pressure to make our parachute work, but most of us wanted to make our parachute fly the slowest because we wanted to win the prize. Everything that we incorporated wasn't learned from the teacher; instead what we incorporated in our parachute was the experiments that we had conducted from the variables we had tested. On the chair project it was harder because we had to constantly go back to our notes and think about how we could use the information in our chair. Since we got our own information, it was easier for us to remember the information and incorporate in our design. All these reasons are why I think that this project should be included as a part of this class next year.

Appendix

Name [redacted] Period 7 Date 02-02-01

GOLDMAN

Parachute Design Test Record

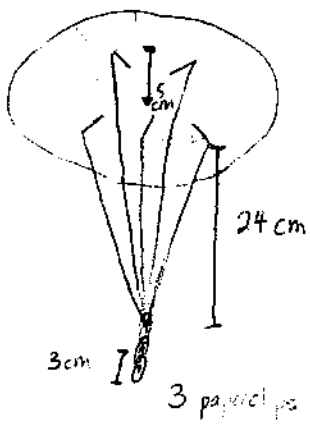
Instructions:

1. You must complete a new "Test Record" each time you significantly change your parachute design.
2. You must complete all parts of the "Test Record."
3. Make at least three tests for each modification or each time you change or adjust a variable.
4. Record all data every time you test your parachute.

Design # 1

Sketch

(Include important dimensions)



Data

Test #	Drop Height	Drop Time
1	6ft	2.5
2	6ft	2.4
3	6ft	2.3
4	6ft	2.3
5	6ft	2.5
6	6ft	2.6
7	6ft	2.3
8	6ft	2.3
9	6ft	2.5
10	6ft	2.6

Changes since last test

Including changes in design of parachute, ropes, drop height, load, etc.

Conclusions:

1. Summarize your data. 2. State what you think you learned with this test. 3. What you plan to do next. (Use the back of this paper if you need more space.)

1. The parachute's drop time from the 10 trials tested at 6ft has an average of 2.43.

2. I learned that if you keep the parachute flat before you drop it it will fall slower than if you left the parachute alone, and dropped it.

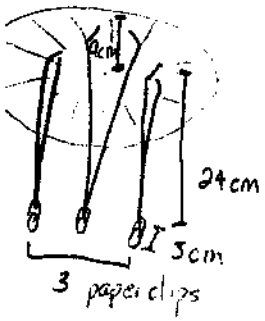
3. I plan to change the location of the strings to check if it affects the rate the parachute falls down.

02-02-01

Design 3

COLEMAN

Sketch



Data

Test #	Drop weight	Drop time
1	6ft	1.5
2	" "	1.7
3	" "	2
4	" "	1.6
5	" "	1.6
6	" "	1.5
7	" "	1.7
8	" "	2
9	" "	1.8
10	" "	1.9

Changes

The parachute has been changed to distribute the weight.

Summary

1. The average of the rate for the parachute was 1.73 secs from 6ft out of the 10 trials
2. I learned that on one parachute, the distribution of the weight didn't work better than all the other tests.
3. What I plan to do with my next design is to try out the distribution of the weight, using more than one coffee filter, to check out whether it may work out better that way.

Name [redacted] Period 7 Date 02-06-2 COLEMAN

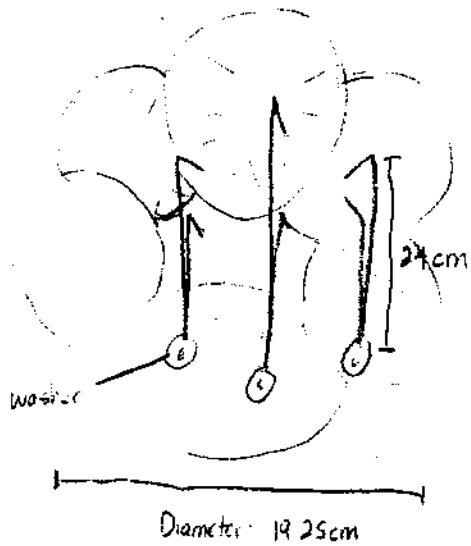
Parachute Design Test Record

Instructions:

1. You must complete a new "Test Record" each time you significantly change your parachute design.
2. You must complete all parts of the "Test Record."
3. Make at least three tests for each modification or each time you change or adjust a variable.
4. Record all data every time you test your parachute.

Design # 4

Sketch
(Include important dimensions)



Data

Test #	Drop Height	Drop Time
1	100m	1.45
2	100m	1.47
3	100 m	1.55
4	100m	1.50
5	100m	1.46
6	100m	1.37

Changes since last test
Including changes in design of parachute, ropes, drop height, load, etc.

Added more coffee filters to distribute weight

Conclusions:
1. Summarize your data. 2. State what you think you learned with this test. 3. What you plan to do next. (Use the back of this paper if you need more space.)

1. The drop time for the parachute with 100 meters for all 6 tests average to 1.44 seconds

2. I learned that it is better to not distribute weight on the parachute no matter how many coffee filters you attach

3. I plan to try a different test to test another kind of parachute to check if a parachute for the parachute might help slow down its flight.

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